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Histological analysis of the Zenker organ in *Pseudocandona marchica*

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A Zenker organ develops in cypridoid, pontocypridoid and macrocypridoid ostracods, as a pump for ejection of giant spermatozoa. According to previous studies, a Zenker organ consists of mainly chitinous parts and numerous tiny muscles. Various morphologies of the chitinous parts of a Zenker organ can be recognized especially among cypridoid ostracods, and these chitinous parts are sometimes preserved in fossil specimens because of their sclerotization. However, we have little knowledge about the detailed structure of this seminal pump, since only few histological studies have been done (in the beginning of the 20th century) and no ultrastructural investigations have been carried out hitherto.

We observed the Zenker organ of the cypridoid ostracod *Pseudocandona marchica* by light microscope and transmission electron microscope. Besides, 3D-reconstruction of the Zenker organ of this species was performed based on the serial semi-thin sections. Our studies showed that numerous muscle fibers surround the central tube of Zenker organ, running in parallel with the central tube (Fig. 1A).

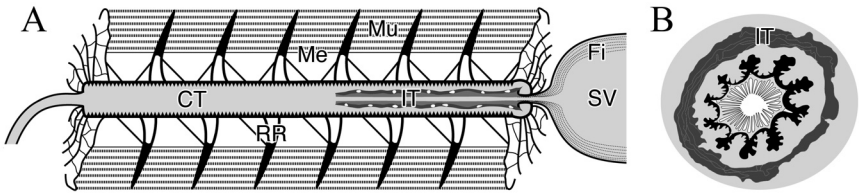

Fig. 1: A: longitudinal section of Zenker organ. B: star-shaped cuticle. CT, central tube; Fi, filamentous structure; IT, inner tube; Me, membrane; Mu, muscles; RR, rosette-shaped ring; SV, seminal vesicle.

The rosette-shaped rings, which are arranged regularly along the central tube, are connected with each other via muscles. A thin cellular membrane exists beneath the muscular layer. Transverse ultra-thin sections show that inside the entrance the cuticle of the central tube is forming a star-shaped pattern (Fig. 1B), with many cytoplastic projections. These projections exhibit a filamentous structure in longitudinal ultra-thin sections and the filaments enter the central tube from the proximal sperm duct through

the star-shaped cuticle. A cellular inner tube exists inside the central tube. This inner tube extends from the entrance of Zenker organ to its middle part where the third rosette-shaped ring is attached. The inner tube opens inside the central tube, forming a hole surrounded by cellular parts – visible in transverse ultra-thin sections. An accordion-shaped structure lines the inner side of the central tube. Based on these histological results, we discuss the pumping system of the Zenker organ.

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